

Seasonal Influenza: Response in the Districts of the Kashmir Province, India

Kadri SM^{1*} and Bouclaous C²

¹*Division of Epidemiology and Public Health, Directorate of Health Services, Kashmir, India*

²*Assistant Professor and Director of Academic Affairs, Gilbert and Rose-Marie Chagoury School of Medicine, Lebanese American University, Lebanon*

***Corresponding Author:** Kadri SM, State Surveillance officer, Division of Epidemiology and Public Health, Directorate of Health Services, Kashmir, India.

Received: March 08, 2016; **Published:** April 13, 2016

Abstract

Given the risk of infectious diseases with pandemic potential, this paper discusses acute respiratory infections in the Kashmir Province and describes the measures taken, in 2015, to contain the spread of Influenza-A H1N1. Recurrent outbreaks call for a reflection on the preparedness of the health system in Kashmir, and point to the need for stronger linkages between public health institutes and laboratories across India.

Keywords: *Influenza A; H1N1; seasonal flu; acute respiratory infections; Kashmir*

Introduction

Seasonal influenza viruses circulate yearly, and contribute to Acute Respiratory Infections (ARIs) in humans. The viruses spread through droplets made when people cough, sneeze, or touch contaminated surfaces. They cause mild to severe illness, and death particularly in high-risk individuals such as pregnant women, children under two years, adults aged 65 years and older, persons with underlying morbid conditions and immuno-compromised individuals [1,2].

There are three known types of influenza viruses, labelled A, B and C. These are further divided into subtypes based on the variety and the combination of two surface proteins: hemagglutinin (HA) and neuraminidase (NA). Several combinations of HA and NA subtypes are possible. Currently, influenza A (H1N1) and A (H3N2) are the circulating seasonal influenza A virus subtypes. In addition, there are two type B viruses that are also circulating, the Victoria and the Yamagata lineages. Type C influenza causes milder infections, and is associated with sporadic and localized outbreaks [3].

Influenza viruses may undergo mutations by antigenic drift or antigenic shift [4]. The antigenic drift produces a new virus strain that is new to our immune system, even in individuals who have been previously exposed through infection or vaccination. The antigenic shift is a sudden change which results in a new influenza subtype or a virus with a combination of HA or NA that has emerged from an animal species that is so different from the same subtype in humans that most people do not have immunity to the new virus. Such a 'shift' occurred in the spring of 2009. A new H1N1 virus emerged to infect people and quickly spread causing a pandemic. Globally, within only three months, the documented cases rose to 277,607 persons and the fatalities to 3,205 [2,4,5]. The pandemic was declared, by the World Health Organization (WHO), as officially over in August 2010. From then on, the H1N1 virus has become a regular flu virus which circulates seasonally, and causes outbreaks in different areas of the world.

Influenza in India

Asian countries have been receiving global attention because of the risk of emerging infectious diseases with pandemic potential; in fact, most antigenic shifts in the influenza virus rise from Asia. In India, in just the first two and a half months of 2015, the number of reported cases of swine flu was 27,000 and 1,500 deaths in the country [6]. This statistic could be a gross underestimation because the cause of death in India is not always properly identified, and the cases of patients who attend the private health sector are not always reported to the government system [7].

Citation: Kadri SM and Bouclaous C. "Seasonal Influenza: Response in the Districts of the Kashmir Province, India". *EC Bacteriology and Virology Research* 2.2 (2016): 90-97.

Due to paucity of epidemiological surveillance regarding influenza serotypes in India, the Expert Group of the Association of Physicians of India does not recommend the use of influenza vaccine in any target group. The Expert Group also considers that there is no evidence to routinely recommend the vaccine in adults (younger than 65 years) with select chronic health conditions [8]. However, indigenous data, from Northern India, seem to suggest that the ideal time for seasonal influenza vaccination using a Northern hemisphere formulation is the months of October and November [9].

The circulating influenza A (H1N1) virus, in 2015, was described by the Indian National Institute of Virology and the National Centre for Disease Control to be the same California strain of 2009, the A/H1N1pdm09 [10]. Consequently, the treatment guidelines, as part of the nation’s pre-pandemic planning efforts, were the guidelines adopted during 2009-2010, with Oseltamivir as the basis for treatment [11]. Although produced in India, the drug is not readily available because it is only sold through a licensed chemist under Schedule X of the Drugs and Cosmetics Act.

In contrast, scientists from the Massachusetts Institute of Technology reported that the influenza A (H1N1) circulating in India, in 2015, acquired mutations rendering the virus more virulent than the previously circulating strains, and probably antigenically distinct from the current vaccine containing 2009 (Cal0709) H1N1 viral hemagglutinin [12].

Both Central and State governments worked relentlessly to contain the impact of H1N1 epidemic by promoting active screening, patient risk categorization, and clinical case management [7]. For confirmation of influenza A (H1N1), the Central government has developed a systematic laboratory-based surveillance network that provides free testing for influenza viruses. But these facilities are few relative to India’s size, and the test in the private sector is expensive [7]. Sentinel surveillance is conducted by the Indian Council of Medical Research in nine sites geographically distributed in northern, central, southern, and eastern India [13]. This surveillance network generates timely epidemiological and virological data as well as insight into the geographical and seasonal variation of influenza transmission within the country. The National Influenza Center (NIC) at Pune sends isolates to the Center for Disease Control and Prevention for antigenic analysis and contributes cumulative weekly influenza surveillance data to the WHO’s Global Influenza Surveillance and Response System [14].

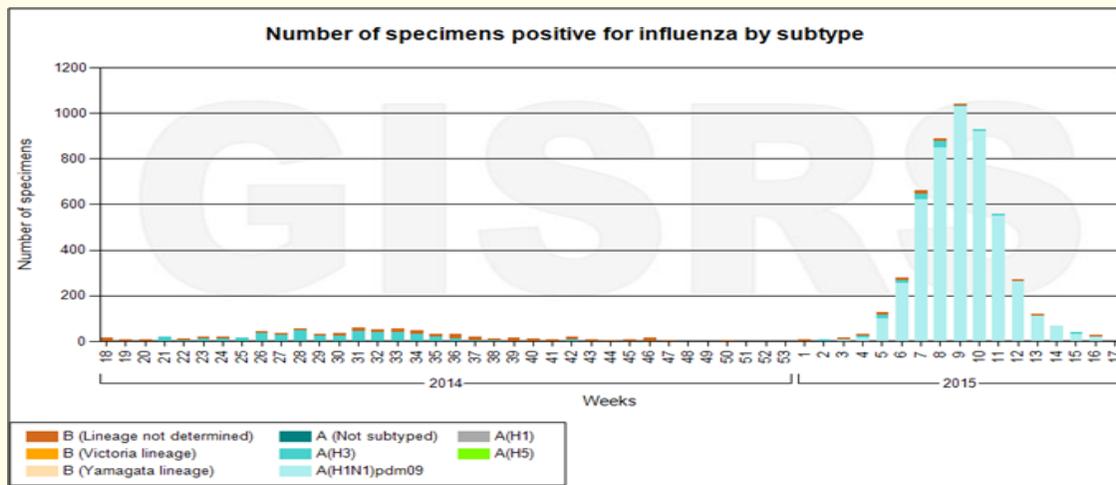


Figure 1: Number of specimens, in India, positive for influenza by subtype between the 18th week of 2014 and the 17th week of 2015.

Influenza Laboratory Surveillance Information by the Global Influenza Surveillance and Response System (GISRS), generated on 01/05/2015.

Influenza in Kashmir

This paper reports on the cases of Acute Respiratory Infections (ARI) which occurred in the Kashmir Province in 2015. It also describes the actions taken since the beginning of the year to contain the outbreak of Influenza-A H1N1.

The State of Jammu and Kashmir is located in the northernmost part of the Indian Union. It lies between 32.17" and 36.58" North altitude; and East to West, between 73.26" and 80.30" longitude. The Province of Kashmir, within the State of Jammu and Kashmir, is composed of twelve districts with an estimated population of four million people. The Province borders Pakistan, China, and Afghanistan.

Previous investigations have shown that the seasonality of the influenza virus depended on the hemisphere of the geographical area, with local variations depending mainly on transmission factors [15,16].

Moreover, sentinel surveillance of influenza has shown distinct peaks across India [13,17,19]. In Delhi, the peaks of influenza activity coincide mainly with the monsoon season, followed by a minor peak in winter in both urban and rural settings [17]. In Northern India, the virus demonstrates peak activity during the winter months which extend from December till March [16]. A first wave of H1N1pdm09 was reported in 2009 in this area. Again, a recrudescence wave extended from November 26, 2012 till February 28, 2013, almost two years after the first appearance of H1N1pdm09 in the region [19-21]. This caused severe illness, hospitalization, and mortality.

The reasons for the recrudescence in the Kashmir area are not clear; however, it is possible that the exposure of those not affected in the previous pandemic may be responsible [21]. Furthermore, the possibility for emergence and spread of antigenically drifted variants of A/H1N1pdm09 in the area call for continued vigilance [14].

The influenza viruses, including the 2009A/H1N1 influenza virus, have been observed during the peak of winter in Kashmir [19]. The severity of disease with 2009A/H1N1 infection varies from study to study [4,22,23]. Recent data from India suggest that 2009A/H1N1 virus was associated with more severe disease outcomes in terms of hospitalization and mortality [24], and that the severity was much higher than that reported for other pandemics of the twentieth century [2,23,25].

Since early 2015, the Province of Kashmir had sixteen confirmed deaths due to influenza A H1N1 virus. The first case of confirmed influenza A H1N1 was identified in the Leh District on January 20, 2015. The health department is usually entrusted with the tracking of ARIs under the Integrated Disease Surveillance Project. Exceptionally in 2015, the health department was asked, by the Union Health Ministry, to trace the H1N1 positive patients diagnosed in district hospitals, and to initiate epidemiological mapping, in order to understand the pattern of circulation of the disease [26].

Kashmir Province	Cumulative numbers
Patients admitted in hospitals (Cat. C)	154
Patients whose samples were sent for analysis	951
Patients whose sample reports were received	782
Patients found positive for H1N1	396
Patients discharged	51
Patients still in hospital	1
Deaths	13
New suspected cases	38

Table 1: Report on Cases and Deaths, between January and March 2015, from Influenza A (H1N1) in the Kashmir Province.

Despite disconcerting news regarding the mutation of the virus [12], the planning at the premier hospital of the state remained unchanged with designated beds in the wards for influenza A (H1N1) cases. The Directorate Health Services (DHS) considers the people in Kashmir to be relatively safer than in the rest of India because the majority do not live in clusters, and have better nutritional status.

At the start of the outbreak, the Directorate of Health Services (DHS) in Kashmir took the following steps to build public awareness, and increase monitoring and response:

1. The DHS broadcasted H1N1 awareness spots on Radio Kashmir and FM radio at Prime time (between 8:30am and 10:00am).
2. Posters and banners concerning Influenza A H1N1 were placed in district and sub district hospitals as well as primary health centres.
3. Educational material about H1N1 flu was sent through the public address system of all the districts of the Kashmir Division.
4. Schools and educational institutes were asked to limit morning assembly until the end of the outbreak, to screen students for symptoms of H1N1, to encourage home isolation in case of symptoms, to not require a medical certificate in case of preventive absenteeism, to promote frequent hand washing, to observe cough and sneeze etiquette, and to disinfect the floors regularly.
5. A *Dos and Don'ts* on H1N1 flu was issued to all local dailies. The sections were published, on a weekly basis, in both English and Urdu. The focus was on preventing the transmission of the disease such as covering nose while sneezing, and mouth while coughing, washing hands frequently, avoiding hand shake and staying away from crowded areas.
6. A help desk for Influenza A H1N1 was put in place in Srinagar International Airport.
7. An action plan and a categorization of suspected cases of Influenza A H1N1 was issued to all Chief Medical Officers (CMOs) and Block Medical Officers (BMOs).
8. A round the clock Influenza A H1N1 control room was set up at the Regional Family Planning Training Center of Barzulla, Srinagar.
9. The monitoring of Acute Respiratory Infection (ARI) cases was initiated in all districts on a daily basis. The influenza H1N1 data went to the Integrated Disease Surveillance Programme (IDSP) which captured data from public health facilities and a few private providers.
10. All districts received personal protective equipment, viral transport media, triple layer masks, N95 masks, and hand sanitizers.
11. The healthcare workers, especially those working in the emergency rooms of district hospitals, were vaccinated against influenza A H1N1 (with Vaxigrip).
12. The CMOs were given a stock of 75 mg and 30 mg Oseltamivir (tamiflu) tablets. The drug was also made available at district level.
13. The cases of Influenza A H1N1 were reported daily to the DHS in Kashmir.
14. Public awareness campaigns continued in the districts. Sub divisional officers sought the cooperation from the general public in the prevention and management of the problem.
15. A daily meeting was held by the Director of the DHS.
16. The directorate of Health held a meeting, every ten days, with the Director of Sheri-Kashmir Institute of Medical Sciences and the advisories of BMOs and CMOs.
17. The state health department initiated epidemiological mapping of H1N1 cases in the Jammu and Kashmir Province.

Patient	Age	Sex	District in Kashmir	Diagnosis	Co morbidity
1	50	F	Srinagar	ARDS* with H1N1 Positive	Cardiac co-morbidity, cardiomyopathy with congestive cardiac failure
2	35	M	Srinagar	ARDS with H1N1 Positive	
3	30	F	Budgam	ARDS with H1N1 Positive	Nine months amenorrhea
4	28	M	Pulwama	ARDS with H1N1 Positive	
5	28	M	Anantnag	ARDS with H1N1 Positive	Cardiac co-morbidity
6	35	M	Pulwama	Sub arachnoid haemorrhage, ARDS with H1N1 Positive	
7	27	M	Shopian	ARDS with H1N1 Positive	
8	50	M	Ganderbal	H1N1 positive	Hypertension, ethanol abuse with history of substance abuse (opioid), HIV positive, hepatitis.B positive
9	45	F	Anantnag	ARDS with H1N1 positive	Acute Myeloid Leukaemia
10	05	M	Baramulla	H1N1 positive	Acute Lymphoblastic Leukaemia
11	45	M	Sopore	H1N1 positive	Hypertension, Renal Failure, Acute Viral Syndrome
12	42	F	Ganderbal	ARDS with H1N1 positive	

Table 2: List of H1N1 patients expired at Sheri-Kashmir Institute of Medical Sciences (SKIMS), Srinagar by March 13, 2015.

SKIMS is a 650-bed facility, and the main tertiary referral center for respiratory cases in Kashmir.

*ARDS Acute Respiratory Distress Syndrome.

The outbreak was declared over in Kashmir after there was no laboratory confirmed case of Influenza A H1N1 for a period of fifteen days. It was feared that more rain and humidity, especially in overcrowded communities with compromised hygiene, would perpetuate the outbreak in small focal pockets. Children under five years, adults over 60 years and people with co-morbid conditions remained at high risk, and in need of special attention till the end of spring.

The strongest recommendation to reduce influenza mortality and morbidity is the vaccination of the following target groups [26]:

All people over the age of 65 years

People under 65 years of age with

- a. Cardiovascular disease - ischaemic heart disease, congestive heart failure, rheumatic heart disease, congenital heart disease, cerebrovascular disease
- b. Chronic respiratory disease - asthma if on regular preventative therapy; other chronic respiratory disease with impaired lung function
- c. Diabetes
- d. Chronic renal disease
- e. Any cancer, excluding basal or squamous skin cancers if not invasive
- f. Other conditions - autoimmune disease, immune suppression, HIV, transplant recipients, neuromuscular and Central Nervous system diseases
- g. System diseases, haemoglobinopathies, children on long-term aspirin

Pregnant women

Influenza vaccine should be offered, and is funded, for pregnant women with a medical condition (as above). The vaccine should be given before the influenza season. Although the inactivated influenza vaccine is considered by many experts to be safe at any stage of pregnancy, others prefer to administer the vaccine in the second trimester to avoid a coincidental association with spontaneous abortion. Practitioners should assess the risks for individual women. Although the publicly funded vaccine is not yet available for pregnant women (without a risk condition), the Immunization Technical Working Group to the Ministry of Health makes the following recommendations for pregnant women: Influenza vaccination is recommended for women who are beyond the first trimester of pregnancy (i.e. greater than 14 weeks gestation) during the influenza season.

Other adults

Healthy individuals should also consider the use of the vaccine, especially if they are in close contact with individuals at high risk of complications. Employers should consider providing influenza vaccine to avoid illness in their employees, especially those engaged in health care and other essential community services.

Conclusion

This outbreak of Influenza A H1N1 provides an opportunity to reflect on the preparedness of the health system in Kashmir. The Integrated Disease Surveillance Programme across the country, and the national public health laboratory testing, allow close monitoring of emerging disease. The international cooperation with the Center for Disease Control and Prevention in Atlanta, through the Global Disease Detection India Center, also helps in recognizing emerging infectious diseases. However, there still is a need for public health institutes and laboratories to build stronger linkages for more efficient and timely public health action.

Funding

No external funding was received for this work.

Conflict of Interest

The authors do not have any conflict of interest to declare.

Disclaimer

The findings and conclusions in this paper are those of the authors and do not necessarily represent the views of the Directorate of Health Services, Kashmir.

Acknowledgement

We hereby acknowledge the work done during the outbreak of Influenza A H1N1 IN 2015 and data entry of the patients (Suspected, confirmed, admitted and deaths).

At District Level

1. All Chief Medical Officers (CMOs), Medical Superintendents, Medical Doctors from all twelve districts of Kashmir Division, India
2. All staff at District Surveillance Units (DSUs) of Integrated Disease Surveillance Programme (IDSP) in all twelve districts of Kashmir Division, India
3. Dr. Parvaiz Koul, Head Department of Medicine and Influenza Laboratory (Sheri Kashmir Institute of Medical Sciences, Soura, Srinagar, Kashmir, India)
4. Medical Superintendents and Nodal officers of Influenza A H1N1 at Tertiary care hospitals of Kashmir Division (Sheri Kashmir Institute of Medical Sciences, Soura, Srinagar, Kashmir, India and SMHS Hospital Srinagar, Kashmir, India)
5. Laboratory Staff at (Sheri Kashmir Institute of Medical Sciences, Soura, Srinagar, Kashmir, India)

At Divisional Level

1. Dr. Afshan Abdulla (State Epidemiologist, IDSP)
2. Dr. Feroz Ahmad (State Microbiologist)
3. Mr. Imtiyaz Amin (State DM)
4. Ms. Irfana Bhat (State District Entry Operator)
5. Ms. Shahria Qureshi
6. Ms. Sawbia Aslam
7. Ms. Gazalla

Bibliography

1. Nicholson KG, *et al.* "Rates of hospitalisation for influenza, respiratory syncytial virus and human meta pneumovirus among infants and young children. *Vaccine* 24 (2006): 102-108.
2. Fraser C., *et al.* "WHO Rapid Assessment Collaboration. Pandemic potential of a strain of influenza A (H1N1): early findings". *Science* 324 (2009): 1557-1561.
3. World Health Organisation. "Recommended composition of influenza virus vaccines for use in the 2015-2016 northern hemisphere influenza season". WHO (2015).
4. Dawood FS., *et al.* "Novel Swine-Origin Influenza A (H1N1) Virus Investigation Team. Emergence of a novel swine-origin influenza A (H1N1) virus in humans". *The New England Journal of Medicine* 360.25 (2009): 2605-2615.
5. Bouvier NM and Palese P. "The biology of influenza viruses". *Vaccine* 26.Suppl 4 (2008): D49-D53.
6. Global Alert and Response (GAR)-Pandemic (H1N1) 2015 May 1. World Health Organization.
7. Dileep M. "Swine flu, a chance to rebuild public health system". *Deccan Herald* (2015).
8. Expert Group of the Association of Physicians of India on Adult Immunization in India. "The Association of Physicians of India Evidence-Based Clinical Practice Guidelines on Adult Immunization". *Journal of the Association of Physicians of India* 57 (2009): 345-356.
9. Koul P, *et al.* "Differences in Influenza Seasonality by Latitude, Northern India". *Emerging Infectious Diseases* 20.10 (2014): 1723-1726.
10. Media alert from the Media Scanning & Verification Cell. IDSP-NCDC. (2015).
11. CDC Novel H1N1 Flu. "The 2009 H1N1 Pandemic: Summary Highlights (2009).
12. Tharakaraman K and Sasisekharan R. "Influenza Surveillance: 2014–2015 H1N1 "Swine"-Derived Influenza Viruses from India". *Cell host and microbe* 17.3 (2015): 279-282.
13. Chadha MS., *et al.* Multi-site virological influenza surveillance in India: 2004–2008". *Influenza and Other Respiratory Viruses* (2011).
14. World Health Organization. "Influenza Laboratory Surveillance Information by the Global Influenza Surveillance and Response System (GISRS)".
15. Kilbourne ED. "Influenza pandemics of the 20th century". *Emerging Infectious Diseases Journal* 12.1 (2006): 9-14.

16. Broor S., *et al.* "Dynamic patterns of circulating seasonal and pandemic A (H1N1) pdm09 Influenza viruses from 2007-2010 in and around Delhi, India". *PLoS ONE* 7.1 (2012): e29129.
17. Saglanmak N., *et al.* "Gradual changes in the age distribution of excess deaths in the years following the 1918 influenza pandemic in Copenhagen: using epidemiological evidence to detect antigenic drift". *Vaccine* 29.Suppl 2 (2011): B42-B48.
18. Potdar VA., *et al.* "Genetic characterization of the influenza A pandemic (H1N1) 2009 virus isolates from India". *PLoS One* 5.3 (2010): e9693.
19. Koul P., *et al.* "Recrudescence Wave of A/H1N1pdm09 Influenza Viruses in Winter 2012-2013 in Kashmir, India". *PLOS Currents Outbreaks* 1 (2013).
20. Koul PA., *et al.* "Pandemic and seasonal influenza viruses among patients with acute respiratory illness in Kashmir (India)". *Influenza and Other Respiratory Viruses* 5.6 (2011): e521-e527.
21. Gurav YK., *et al.* "Pandemic Influenza A (H1N1) 2009 outbreak in a residential school at Panchgani, Maharashtra, India". *Indian Journal of Medical Research* 132 (2010): 67-71.
22. Belshe RB. "The origins of pandemic influenza lessons from the 1918 virus". *New England Journal of Medicine* 353 (2009): 2209-2211.
23. Mishra AC., *et al.* "Pandemic Influenza (H1N1) 2009 is associated with severe disease in India". *PLoS ONE* 5 (2010): e10540.
24. Mukherjee A., *et al.* "Prevalence and epidemiology of pandemic H1N1 strains in hospitals of eastern India". *Journal of Public Health and Epidemiology* 2 (2010): 171-174.
25. Ul-Hassan M. "Epidemiological mapping of H1N1 cases to be done in JK". *Rising Kashmir* (2015).
26. Grohskopf., *et al.* "Prevention and Control of Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices, United States, 2015-16 Influenza Season." *Morbidity and Mortality Weekly Report* 64.30 (2015): 818-825.

Volume 2 Issue 2 April 2016

© All rights reserved by Kadri SM and Bouclaous C.